Integrating climate change adaptation into development planning

A practice-oriented training based on an OECD Policy Guidance

Modules on **Adaptation Monitoring and Evaluation (M&E)**

Training Manual

November 2013

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

BMZ Federal Ministry for Economic Cooperation and Development

On behalf of

Federal Ministry for the Environment, Nature Conservation and Nuclear Safety

of the Federal Republic of Germany

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GIZ's Climate Protection Programme for Developing Countries helps developing countries to adapt efficiently and appropriately to changed climatic conditions. Working together with our partners, we identify the options for action with regard to affected people, economic sectors and ecosystems.

The key task of the Climate Protection Programme for Developing Countries is to mainstream climate protection within the various activities of German Development Cooperation. This applies both to reducing greenhouse gas emissions and to measures to adapt to climate change.

These tasks, however, cannot be successfully tackled by climate protection experts alone. The Climate Protection Programme for Developing Countries can therefore only work effectively if it is integrated into the networks of development cooperation and globally organised climate protection, and collaborates with national and international partners.

http://www.giz.de/climate

Inventory of Methods for Adaptation to Climate Change (IMACC) is a global project by GIZ funded by the **International Climate Initiative** of the German **Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU)**. The project aims at user-driven application and advancement of existing tools and methods for adaptation, developing capacities for adaptation action and supporting South-to-South exchange, particularly among its seven partner countries: Grenada, India, Indonesia, Mexico, Philippines, Tunisia and South Africa.

IMACC is operating the platform AdaptationCommunity.net which provides introduction to key topics, examples of adaptation experiences as well as webinar recordings and an exchange forum. IMACC has also supported the development of additional modules of the training "Integrating Climate Change Adaptation into Development Planning" including the new modules on Monitoring and Evaluation (M&E).

Have you carried out or participated in the training? If yes, we would appreciate hearing from you! Please send your feedback (who organised the training? who participated in the training? how did you find it? What worked and what did not?) to climate@giz.de.

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Introduction to the course

Rationale and background of the course

Adapting to climate change is a rapidly growing challenge, particularly for developing countries. Even if greenhouse gas emissions are reduced significantly in the coming years, climate change impacts, such as drought, floods, severe weather events and sea-level rise, are likely to result in food shortages, increases in vector-borne diseases, infrastructure damage and the degradation of natural resources. The poor will be affected disproportionately[1].

Development and investment choices today influence the adaptive capacity of people and their governments well into the future. We cannot afford to delay adaptation planning and action. Yet, many development policies, plans and projects currently do not take climate change into account due to a lack of awareness and clarity on how to effectively develop and integrate adaptation options.

Integrating adaptation into development cooperation provides an essential opportunity to make more climate-resilient development investments. OECD's Environment Policy Committee (EPOC) and its Development Assistance Committee (DAC) therefore developed the *Policy Guidance on Integrating Climate Change Adaptation into Development Co-operation*[2] (OECD Guidance) with the aim of promoting understanding and identifying appropriate approaches and practical ways for **integrating climate adaptation into development policies and activities** at national, sectoral, project and local levels.

The Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, in close coordination with the OECD, developed this training course and associated materials based on their involvement in the OECD Guidance, extensive adaptation activities on the ground in developing countries, and the GIZ tools for mainstreaming climate change into development cooperation activities, namely Climate Proofing for Development, Environment and Climate Assessment of GIZ projects, and GIZ's Climate Strategy Advice. The training material has subsequently been updated and extended. In 2012, new modules on understanding climate science, finding climate information and managing uncertainty were added. In 2013, the module on Monitoring and Evaluation (module 6) was updated and extended to reflect the specifics of measuring adaptation and to meet international demand for capacity building on this topic.

[1] An animated movie produced by GIZ explains climate change and adaptation (Length: ~ 5 Minutes). It is available in 7 languages at GIZ's You tube channel: http://www.youtube.com/playlist?list=PLcjTOiq3BComgKmYvWsflogrH1VxxEn7o

[2] http://www.oecd.org/document/26/0,3343,en_2649_34361_44096282_1_1_1_1,00.html

Overview of training modules

The following overview displays the Modules of the full OECD training and indicates the additional M&E Modules in red:

M 1 – Apply a climate lens:
Identify the relevance of climate change to a policy, programme, plan or project.

M 2 – Interpret climate data:
Understand how to interpret and use different standard climate data sources.

- **M 2a – Understanding climate science**
- **M 2b – Finding climate information**
- **M 2c – Managing uncertainty**

M 3 – Assess vulnerability:
Identify factors contributing to vulnerability in a system.

M 4 – Identify adaptation options:
Identify a range of adaptation options to adjust or improve planning and management.

M 5 – Select adaptation measures:
Evaluate and prioritise options using selected criteria.

M 6 – Introduction to adaptation M&E:
Rationale and concepts for adaptation M&E.

- **M 6a – M&E for adaptation at national / subnational level:**
  Developing a national adaptation M&E system including indicators.
- **M 6b – M&E for adaptation projects and programmes:**
  Developing a results framework and indicators.

M 7 – Develop institutional capacity for adaptation:
Identify institutional capacities needed to deal with adaptation as a continual change process.

M 8 – Local climate stresses, vulnerability, resilience:
Identify local information on climate change vulnerability.

M 9 – Take action at local level and beyond:
Identify action at the local level and how it links to sub-national, national and other actors.

M 10 – Integrate adaptation into the project cycle:
Identify key steps to integrate adaptation according to the various steps of the project cycle.

Training format

The new modules on M&E can be run as **part of the overall training** course as outlined above or in a **stand-alone format**. The stand-alone training is targeted at **individuals who are involved in designing monitoring and evaluation systems for adaptation at (sub)national level (Module 6a) or project/programme level (Module 6b)**. For an in-depth coverage of these modules a good understanding of climate change adaptation is required. Furthermore, it is recommended that participants have some background knowledge on M&E in general. The time required for the different training formats is shown in Table 1.

Format	Modules	Time required
Stand alone M&E training	6, 6a	2 days
	6, 6b	2 days
	6, 6a, 6b	3 days
As part of OECD course	1,3-5, 6, 6a *or* b	4.5 days
	1,3-5, 6, 6a *&* 6b	5 days

Table 1: Times required per training format

Further details about the different training formats are provided in the publication *Tailor made training courses on climate change adaptation – A cook-book for different formats and target groups* as well as in the trainer's handbook. Both can be downloaded alongside all other modules of the training on the OECD Environment and Development Website.[3] Specific materials for the stand-alone M&E training format including a comparative study of ten M&E adaptation systems as well as a factsheet about the M&E training are available on AdaptationCommunity.net ➜ Knowledge ➜ M&E ➜ Tools and Trainings or ➜ Further reading.

This training manual has been designed for the **stand-alone format** of the **adaptation M&E** modules. The complete training manual "*Integrating climate change adaptation into development planning*" can be downloaded at the OECD Environment and Development Website.[3]

Aim of the M&E Modules

The M&E-Modules will make the trainees familiar with

- rationale, potential and challenges of M&E for adaptation,
- processes to develop an effective M&E system as part of adaptation planning,
- specific approaches for M&E at the national and project level
- developing adaptation-specific indicators.

Training Methodology

The course is based on the Harvard Case Method,[4] which conveys teaching messages mainly through **interactive practical work by trainees**. The training deals with the fictitious Federal Republic of Zanadu, a situation closely based on real life conditions and challenges. For the M&E Modules, additional case situations outside Zanadu with special relevance to the subject have been developed.

[3] http://www.oecd.org/dac/environment-development/integratingclimatechangeadaptationintodevelopmentplanningapractice-orientedtrainingbasedontheoecdpolicyguidance.htm

[4] see e.g. http://harvardmagazine.com/2003/09/making-the-case-html
http://www.aacu.org/peerreview/pr-wi05/pr-wi05realitycheck.cfm

All modules follow the same sequence, including the following crucial **elements**:

- The **introduction**, given by the trainer, provides the necessary theoretical background and introduces participants to the case work.
- The **case work** gives participants the opportunity to work through the different aspects linked to climate change adaptation in a systematic manner. Participants assume the roles of 'case work experts' in charge of the specific module's task.
- The 'case work experts' **present their results** to the plenary. This is an opportunity to share experiences and foster mutual learning. Trainers offer alternatives and corrections when necessary.
- In a **final reflection**, the participants reassume their own real-life position. They reflect on their case experiences and link them to their own work in order to make the newly gained knowledge more applicable. Trainers support through guiding questions.

Guidance for effective group work

- For effective and efficient work, a working group should select a facilitator, a time keeper and a presenter.
- Take your time to read through the task description and see if everybody is on board.
- The main learning objective is to learn about the systematic approach and not to be comprehensive in the task
- The working groups work independently.
- Trainers can be asked for advice.

Box 1: Guidance for effective group work

Training Package

- The **Training Manual** provides the storyline for delivering the training. It explains the case work tasks and includes all necessary supporting information for completing the exercises.
- The **Handouts** provide a summary of learning points and references for each module.
- The **Trainer's Handbook** consists of two parts. Part I presents basics on participatory training methodology and the Case Method and gives hands-on guidance on developing a good training course agenda. Part II provides detailed information as well as suggestions on running the modules and Action Learning exercises.
- A library of **PowerPoint Slides** with notes supports the input sessions.
- Specifically for the M&E modules, **method briefs** and **factsheets** describing real M&E system at national and sub-national level can be used to learn from real cases and reflect the content of the M&E sessions. These additional M&E materials are available on AdaptationCommunity.net under 'Knowledge' ➜ M&E.

The training manual, handouts, trainer's handbook and presentation slides can be downloaded free of charge at: www.oecd.org/dac/environment/climatechange[5]

[5] Direct link: http://www.oecd.org/environment/environment-development/integratingclimatechangeadaptationintodevelopmentplanningapractice-orientedtrainingbasedontheoecdpolicyguidance.htm

Introduction to Zanadu

The Federal Republic of Zanadu is a sub-tropical developing country. Because of its large variation in elevations, it spans a wide range of climates. These range from a sub-tropical zone in the south with highly seasonal rainfall, to snow covered mountains in the north, to a semi-arid plateau in the west (see map on p.12).

Geography

Zanadu covers an area of 300,000 km^2 (a size similar to Philippines, Ecuador or Ivory Coast). Almost all of the country is drained by the **River Alph**, which rises in the glacier-covered peaks of the Khorus mountains of the neighbouring nation of Khoresia and enters northern Zanadu. The middle reach of the Alph bisects a large, fertile alluvial flood plain. Where the river empties into the sea to the south, it has created a large low-lying delta of fertile sediments. To the west, the land rises to a plateau of about 1,000 metres, which, while having poor soils, receives more limited rainfall than the rest of the country. Figure 1 shows a map of Zanadu.

Demographics

The current population is **60 million**, giving the country a population density of 200 per km^2 (similar to Pakistan, Burundi, Haiti or Jamaica). Nationwide, the population is almost evenly divided between rural (48%) and urban (52%) areas. However, the rural/urban breakdown differs significantly among states.

The population growth rate is currently 1.9% per year, but declining slowly. Median estimate of the expected population in 2050 is 105 million. Most of the population growth over the coming 40 years is expected to take place in urban areas, driven by continuing **rural to urban migration**.

The national literacy rate is around 68% (76% for males and 60% for females). The country has a widespread primary education system with more limited opportunities for secondary education. University graduates constitute only about 5% of the population.

Climate

The climate of Zanadu varies from alpine to sub-tropical.

The observed **change in average annual temperature** over the past 50 years ranges from +0.7° C in the Alph delta to +1.2° C in the Khorus mountains. The average **sea level** has risen about 10 cm over the same period. **Average annual rainfall** is largely unchanged, but the distribution has changed markedly, with more runoff in winter and early spring and less in the late summer and fall. Snowmelt discharge is important for meeting irrigation demand for water.

Water supply is under stress of population growth and impacts by climate change. Water shortage is regarded as a potentially serious constraint to development.

In the past, the lower Alph plain has experienced a **devastating flood** roughly every 10 to 15 years. In recent years, however, flood frequency appears to be increasing and now occurs about every 8 to 10 years. Further projected impacts from climate change are described below.

Governance

Zanadu is a parliamentary democracy, headed by a Prime Minister, with extensive constitutional powers. Ministries cover all important sectors at both national and state levels. Most important are the prime ministry and ministries of planning, finance, industry, water resources and agriculture. There are environmental ministries at both national and state levels, but these are not well-resourced. In general, the approach to governance can be described as *reactive* rather than *pro-active.*

Infrastructure

All major cities are connected by all-weather roads, but rural connector roads are often in poor condition and sometimes impassable during the rainy season.

The Alph river dam provides irrigation water storage and flood control services in addition to power generation. About 20 million mobile phones are now in service.

Economy

The Zanadu economy is in transition from being largely rural and agricultural to one where manufacturing and service sectors predominate. Current shares of different sectors to GDP and employment are shown in Table 2. Per capita income is currently around €1,800/year. Five-year average annual GDP growth is about 4%.

Shares of GDP and Employment		
Sector	**GDP**	**Employment**
Agriculture	30%	50%
Manufacturing	20%	10%
Services	50%	40%

Table 2: Zanadu GDP and employment per sector

Agricultural outputs include cotton, sugar, wheat, rice, cacao, palm oil, animal products, timber and some seafood. **Manufactured outputs** include textiles (including products from a growing garment industry), simple machinery and fertilizer. Export-oriented industries constitute roughly 15% of the economy.

Table 3 below summarises key features of Zanadu.

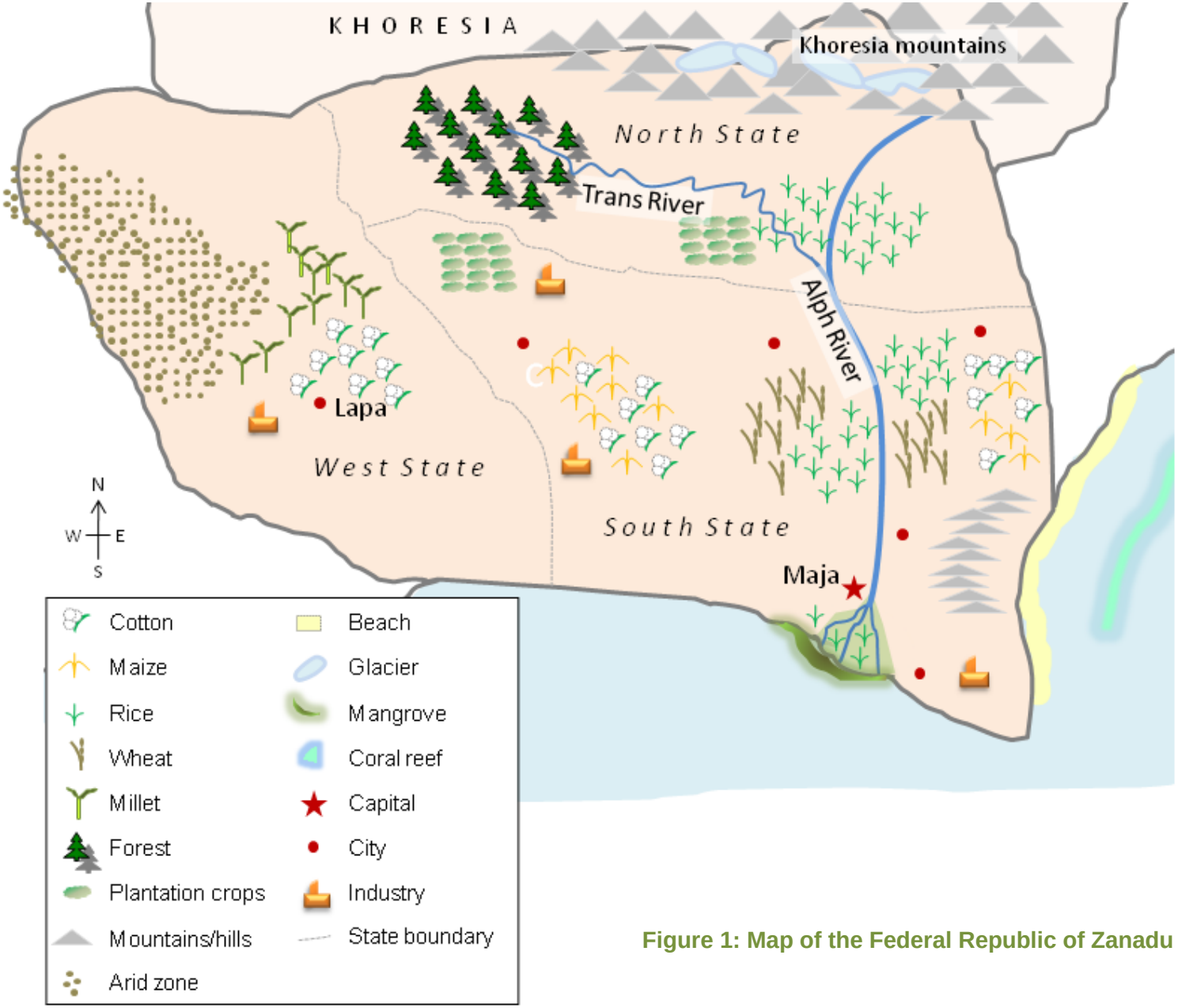


Figure 1: Map of the Federal Republic of Zanadu

Key Features of Zanadu		
Feature	**Value**	**Notes**
Government	Parliamentary democracy	Federal system
Population	60 million	Rural (48%), Urban (52%)
Population growth rate	1.9%	Declining
Literacy rate	68%	Male (76%), Female (60%)
Major river	Alph	Snowfed
Renewable water availability per capita	1600 cubic meters	Declining to 1000 CM by around 2040
Observed temperature rise, 1950-2000	0.7 -1.2 degrees C	Mountains (1.2° C), Delta (0.7° C)
GDP per capita	€ 1800 per year	Varies strongly among regions
GDP growth rate	4% per year	5 year average
Composition of economy	Mixed	Agric. (30%), Mfg. (20%), Services (50%)
Composition of employment	Mixed	Agric. (50%), Mfg. (10%), Services (40%)
Development budget	€ 1500 million	In addition € 750 million from FDI
Power generation	Primarily thermal	Coal (75%), Hydro (15%), gas (10%)

Table 3: Key features of Zanadu

National Development Plan

The development process of the Federal Republic of Zanadu is steered by the National Development Plan (NDP) 2012-2022. All relevant Sector Ministries are involved in the plan's elaboration under the guidance of the National Planning Commission (NPC) of Zanadu. Key goals of the NDP are shown below (the grey shaded goals are addressed in the training modules).

(i) Income and Poverty

- Average GDP growth rate of 9% per year in the NDP period.
- Agricultural GDP growth rate at 4% per year on the average.
- Increase and diversify agricultural production and rural incomes.
- Increase share of GDP by new export-oriented industries to 20% by 2020.
- Generation of 6 million new work opportunities.
- Reduction of unemployment among the educated to less than 5%.
- 20% rise in the real wage rate of unskilled workers.
- Reduction in the head-count ratio of consumption poverty by 10 percentage points.

(ii) Education

- Reduction in the dropout rates of children at the elementary level from 52.2% in 2003–04 to 20% by 2011–12.
- Developing minimum standards of educational attainment in elementary schools to ensure quality education.
- Increasing the literacy rate for those aged 7 and above to 85% by 2011–12.
- Reducing the gender gap in literacy to 10 percentage points by 2011–12.
- Increasing the percentage of each cohort going to higher education from the present 10% to 15% by 2011–12.

(iii) Health

- Infant mortality rate (IMR) to be reduced to 28 and maternal mortality ratio (MMR) to 1 per 1,000 live births by the end of the Eleventh Plan.
- Total Fertility Rate to be reduced to 2.1 by the end of the Eleventh Plan.
- Safe drinking water supply and sanitation to be available for 80% of population by 2020.
- Malnutrition among children aged between 0–3 to be reduced to half its present level by the end of the Eleventh Plan.

(iv) Women and Children

- Sex ratio for age group 0–6 to be raised to 935 by 2011–12 and to 950 by 2016–17.
- Ensuring that at least 33% of the direct and indirect beneficiaries of all government schemes are women and girls.
- Ensuring that all children enjoy a safe childhood without any compulsion to work.

(v) Infrastructure

- To ensure electricity connection to all villages and BPL (Below Poverty Line) households by 2020.
- Increase the percentage of hydropower from 15 to 25% by 2020.

- To ensure all-weather road connection to all habitations with populations of 1,000 and above.
- To connect every village by telephone and provide broadband connectivity to all villages by 2020.
- To provide homestead sites to all by 2015 and step-up the pace of house construction for rural poor to cover all the poor by 2016–17.

(vi) Water and Environment

- To increase forest and tree cover by 5 percentage points.
- To attain WHO standards of air quality in all major cities by 2015.
- To treat all urban waste water by 2015 to clean river waters.
- To maintain minimum flows of all rivers to meet the needs of agriculture, municipal water supply, transport and industry.
- To increase energy efficiency by 20% by 2016–17.
- To reduce groundwater withdrawals by 2015.

There is a high probability that some current incidences can be linked to climate change: changes to mountain glaciers and snowfall, erosion in coastal areas, declining crop productivity due to drought and less predictable rains. The overarching development goals of poverty reduction and sustainable economic growth in particular are becoming endangered.

The Government of Zanadu has therefore decided to reflect climate change adaptation priorities in the new development plan. The National Planning Commission has established a **climate change advisory group** to support this process. So far, Zanadu does not have a national climate change adaptation strategy nor does it have any adaptation targets or a specific budget to fund adaptation activities.

Climate information: expected climatic changes

Temperature

- Rising by 2 to 4 degrees Celsius in the Khorus Mountains by the 2050s.
- On the plains, expected rise of between 1.4 and 2.0 degrees Celsius by the 2050s (compared with 1940-60 average).

Precipitation

- A slight average increase in annual precipitation by the 2050s compared with the 1970 to 2000 average.
- More autumn and late winter precipitation in mountains to fall as rain rather than snow.
- Higher intensity rainfall events with longer periods between events.
- Later arrival, shorter duration of seasonal heavy rains

Sea parameters

- Rise in sea level of 0.2 to 0.4 metres expected by the 2050s.
- Warmer sea surface temperatures.

Projected climate change impacts

Surface hydrology

- Snowmelt runoff begins 2 to 4 weeks earlier by the 2050s.
- More variable river flows.
- More frequent floods during summer.
- Longer periods without significant precipitation.
- Lower late summer river flows.
- Higher reservoir evaporation losses.
- Increased erosion of sloping land and reservoir catchments.

Groundwater hydrology

- Recharge to shallow groundwater reduced by 15 to 25% by the 2050s.

Coastal areas

- Submergence of about 10% of the Alph river delta by the 2050s.
- Increased incidence of tidal inundation and storm surges in Delta.
- Shallow coastal aquifers become more saline.
- Saline tidal bores push further up the Alph.
- Less frequent but more intense cyclone impacts.

Agriculture

- More frequent crop failures due to floods and droughts.
- Crop water requirements increase by 3-5% by 2030.
- Maize and wheat yields depressed by 1-2°C temperature rise.
- Cotton yields not affected by 1-2°C temperature rise.
- Rice threatened with sterility by higher temperatures during flowering.
- Plantation crop yields enhanced by warmer temperatures (assuming water availability).

Overview of the M&E modules

The new modules on adaptation M&E are:

- Module 6: **Introduction to adaptation M&E**
- Module 6a: M&E for adaptation at the **national/subnational** level
- Module 6b: M&E for adaptation at the **project/progamme** level

The modules are further divided into different **sessions** as shown in the tables below. These new modules replace the previous module 6 on M&E.

Introduction to adaptation to climate change		
Session	**Title**	**Key content**
1	**Introduction to adaptation**	• The Greenhouse effect • What is adaptation? • Adaptation and development
	Action learning	• Adaptation terminology
Module 6: Introduction to adaptation M&E		
Session	**Title**	**Key content**
2	**Introduction to adaptation M&E**	• Rationale for adaptation M&E • Levels of application • Challenges and opportunities

Module 6a: M&E for adaptation at national / subnational level		
Session	**Title**	**Key content**
3	**Describe the context**	• What is the (sub)national context? • What is the purpose of the M&E system? • Who are the intended users?
4	**Define indicators**	• Formulate indicators for adaptation responses and climate change impacts
5	**Indicator quality check**	• Build adaptation-specific indicators using the SMART rule
6	**Use of existing M&E systems**	• Explore how existing M&E systems can be utilized or adjusted to be useful for adaptation M&E
7	**Real case reflection** (to be tailored to the specific circumstances and target audience)	• In-depth analysis of practical examples from various countries / organisations
8	**Road map development**	• Transfer learned knowledge to real work context

Module 6b: M&E for adaptation at project and programme level		
Session	**Title**	**Key content**
9	**Planning the implementation of adaptation measures**	• Analysing the adaptation context • Defining goals and objectives • Identifying steps for implementation
10	**Development of a results chain / results system**	• Get to know a results chain • Define outputs and outcomes
11	**Development of indicators**	• Formulate indicators for project outputs and outcomes
12	**Real case reflection** (to be tailored to the specific circumstances and target audience)	• In-depth analysis of practical examples from various projects / organisations
13	**Road map development**	• Transfer learned knowledge to real work context

All sessions follow the same sequence of a short introductory presentation by the trainer, case work in groups, presentation of results and a final reflection (see p. 8 on the training methodology). Exceptions are the '**real case reflections**' (sessions 7 and 12) which can be tailored to the specific focus of the training. The purpose of the real case reflections is to learn from existing M&E examples. The sessions on road map development and real case reflection can be extended into a **workshop** towards the development of a national or subnational adaptation M&E system. Thus, sessions 1-2 and 3-6 (national level) or 9-11 (project level) respectively can be the introduction to a workshop on M&E. This setup has been successfully tested in Mexico (compare workshop report at AdaptationCommunity.net ➜ Exchange ➜ Workshops & Trainings).

Further details and handouts for each session can be found in the **trainer's handbook** which is available on the OECD Environment and Development Website and on AdaptationCommunity.net ➜ M&E.

Impressions from the pilot training in Mexico in May 2013.

Module 6: Introduction to adaptation monitoring and evaluation

6	Introduction to adaptation M&E
6 a	M&E for adaptation at (sub)national level
6 b	M&E for adaptation projects and programmes

Learning objective of the Module

Understand the rationale, the potentials and challenges as well as different types and application areas of adaptation M&E.

Session 1: Background and basic principles of climate change and adaptation

Introductory presentation: Climate change and adaptation

- What is climate change?
- What is adaptation to climate change?
- How does climate change impact on development?

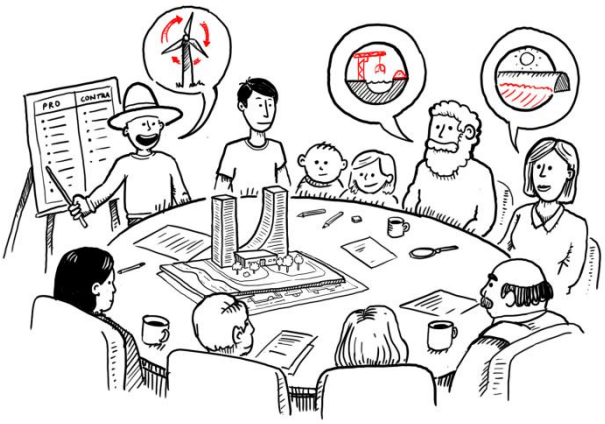
Context

The introductory presentation has shown that adaptation to climate change needs a well-organized planning and implementation process. Political commitment is essential and resources need to be secured in order to implement adaptation interventions. Social acceptance and active stakeholder cooperation is necessary. The challenges in successfully implementing adaptation can be categorised into (i) political/institutional, (ii) economic/financial, (iii) social and (iv) technical challenges.

Instructions to corner game

Each corner of the room represents one of the four categories of challenges for implementing adaptation. Select a corner which represents the challenge you find most relevant and formulate reasons why you have chosen this challenge. In a moderated group discussion you might defend your arguments.

Short animated movie on Climate Change Adaptation



GIZ and the Potsdam Institute for Climate Impact Research jointly developed the short animated movie

*"**We know enough about climate change: It's time for decisions now!**"* (5:42 minutes).

The movie explains climate change and its consequences, introduces adaptation to climate change and illustrates adaptation options. It advocates for a participatory approach to adaptation planning and highlights the benefits of timely action rather than delaying decisions. *We know enough about climate change: It's time for decisions now!*
The movie is available in 10 languages and can be viewed online at AdaptationCommunity.net under *Knowledge* and 5 minute film about adaptation. It can also be downloaded in different file formats on the website of the Potsdam Institute for Climate Impact Research.

Session 2: Rationale for and challenges of adaptation M&E

Introductory presentation: Adaptation Monitoring and Evaluation (M&E)

- Rationale for adaptation M&E
- Potentials and challenges of adaptation M&E
- Levels of application (national, project/programme, portfolio level)

Context

The introduction described the following challenges of adaptation M&E:

- Uncertainty
- Long time horizon
- Complexity
- No universal metric to measure success

Instructions for case work

- You are invited to reflect how far these challenges have already been relevant in your work context and whether you have envisaged or tested any strategies to cope with these challenges.
- Form a 'whisper group discussion' with your neighbour. Use **Matrix 1** to document the findings of your discussion. **Matrix 1**Matrix 1 further differentiates the four categories of challenges to make it more practical. If you wish you might specify additional challenges. You don't have to elaborate on each row. Focus only on those challenges which are / were relevant in your work.

Matrix 1: Identify adaptation M&E challenges and ways to cope with them

Category of challenge	Challenge already faced in your work context? If so, please describe your particular challenge	Have you already developed ways to cope with the challenge?
Unclear cause-effect-relationship		
Uncertainty about future developments (climatic or socio-economic)		
Long time-scales		
Diverse definitions of success		
Missing 'business-as-usual' scenario		
Need of resources (money, personnel)		
Lack of data		
Other challenge (please specify)		

Module 6a: M&E for adaptation at national / subnational level

6	M&E Introduction
6a	**M&E for adaptation at (sub)national level**
6b	M&E for adaptation projects and programmes

Learning Objectives of the Module

Understand how to organize a systematic process for developing an adaptation M&E system at national / subnational level.

Session 3: Describe the context of a national M&E system

Figure 2 illustrates the development of a (sub)national M&E system in five steps. Session 3 is about step 1.[6]

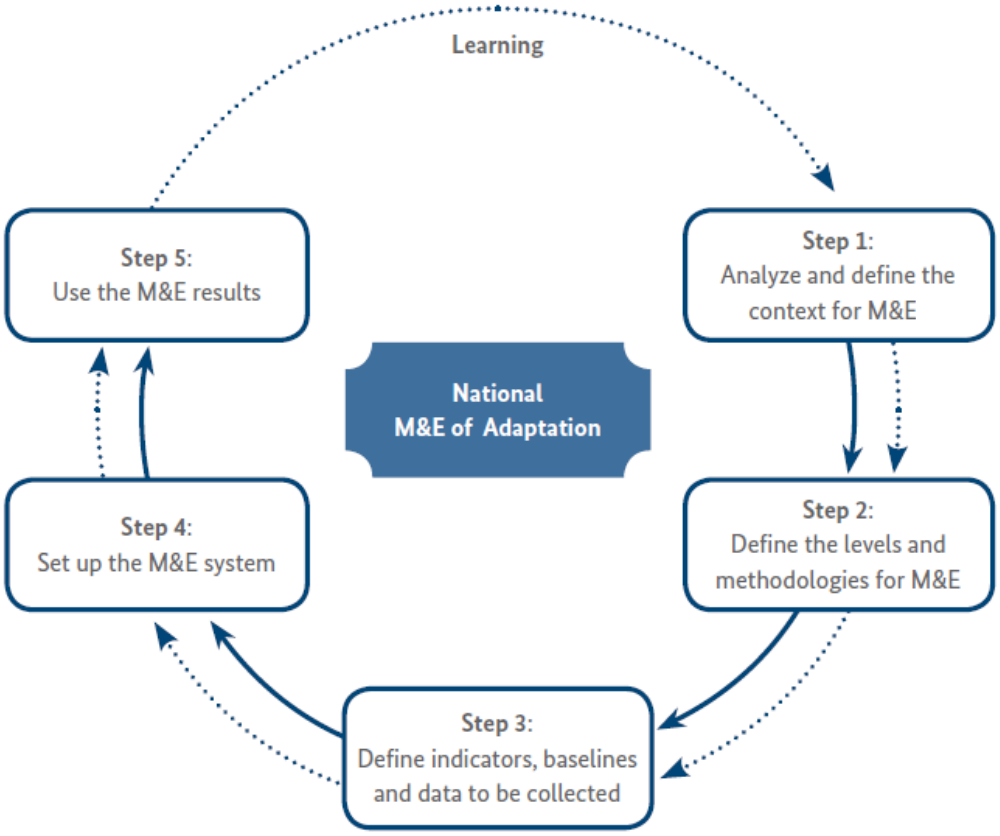


Figure 2: Development of a national adaptation M&E system

[6] For further details please see the GIZ factsheet available at http://star-www.giz.de/fetch/bw44PMg1G00Q000bXo/giz2013-0532en-climate-national-monitoring-evaluation.pdf

Context

Zanadu

The Government of Zanadu does not have an overarching climate change adaptation strategy at national level, but is in the process of climate proofing its National Development Plan (2012-2022). Four priority areas of relevance for adaptation have been identified: agricultural production, water and sanitation, coastal zones and infrastructure. In each of them, pilot activities are under-way. Recently the Government decided to begin the development of an M&E system in order to ensure that the envisaged adaptation measures will be successfully implemented.

Khoresia

Zanadu's neighbouring country Khoresia wants to ensure that its Climate Change Adaptation Plan for Action (CCAPAK) is implemented in a way that its intended results will be achieved. It therefore aims to develop a results-based M&E system.

Both governments decided to organize the development of the M&E system in several stages beginning with a description of the context of the future M&E system (compare Figure 2).

Instructions for case work

- You are a member of the M&E advisory group supporting the Government of Zanadu respectively the expert group of Khoresia in developing the M&E system.
- You are requested to clarify the context of the M&E development process. In doing so please respond to the **4 key questions** as formulated in Matrix 2Matrix 2Matrix 2**Matrix 2.**
- Organize your work in sub-groups, whereas each sub-group focuses on only one of the two counties, i.e. Zanadu or Khoresia.
- You may refer to the following information and support material.
    - **Exhibit 1a** for Zanadu on page 25
    - **Exhibit 1b** for Khoresia on page 26
    - **Figure 3** illustrates the potential focus areas of M&E.

Matrix 2: Key questions for context description

Context of the M&E system	**Zanadu:** No specific adaptation plan; pilot adaptation measures based on the National Development Plan (NDP)	**Khoresia:** Fully developed national adaptation plan: Climate Change Adaptation Plan for Action (CCAPAK)
Why is an M&E system needed? What is its main purpose?		
What should be monitored and why? For instance • Climate parameters (E) • Climate Change Impacts (I) • Vulnerabilities (V) • Tracking of adaptation activities (AA) • Monitoring adaptation results (AR) (compare Figure 3)		
Who would be the users of the generated information?		
What are recommendations regarding institutional set-up?		

Figure 3: Potential focus areas of adaptation M&E

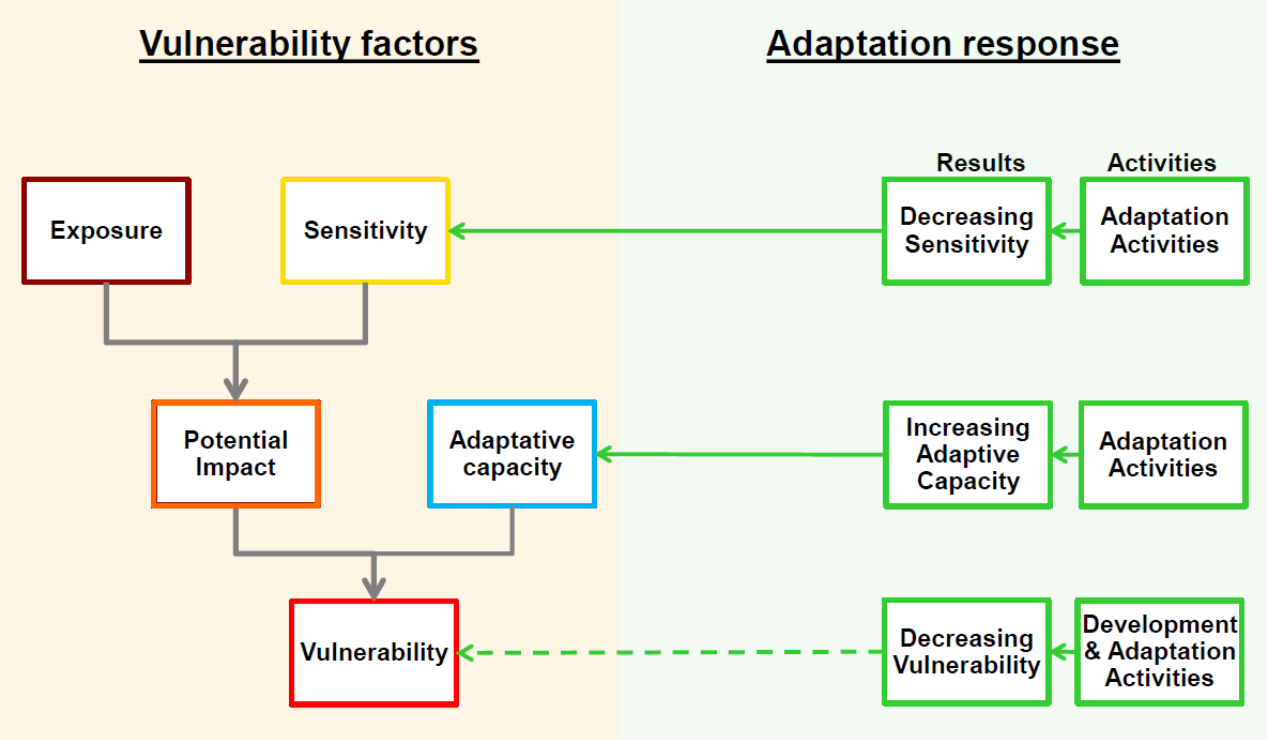


Exhibit 1a: Key features of the adaptation process in Zanadu

Climate Information and projected climate change impacts: see pages 14-15.

Planning Framework: So far Zanadu does not have an overarching climate change adaptation strategy at national level, but is in the process of climate proofing its National Development Plan. Four priority areas of relevance for adaptation have been identified: agricultural production, water and sanitation, coastal zones and infrastructure. In each of them, pilot activities are underway.

Institutional set-up: Zanadu is still rather weak in its institutional set-up on climate change. There is no central coordinating body for climate change. The National Ministry for Planning coordinates the pilot activities together with development sector ministries. There is no strong cross-sector coordination and ownership on climate change issues differs among the ministries. The Ministry of Environment is considered relatively weak in the 'power game' of the country's Government. Some sectors, especially agriculture, take a more proactive role and mainstream climate change considerations into their sector strategies. Besides that, several adaptation initiatives and strategies have evolved at state level.

Exhibit 1b: Key features of the adaptation process in Khoresia

Climate Information

Temperature (compared with 1940-60 average)

- Expected rise between 1.2 and 2.0 degrees Celsius by the 2050s
- In the high elevations of the Khorus Mountains projected average increase of up to 2.5 degrees Celsius by the 2050s.
- Increased number of hot days (> 30°C) and fewer days below 0°C

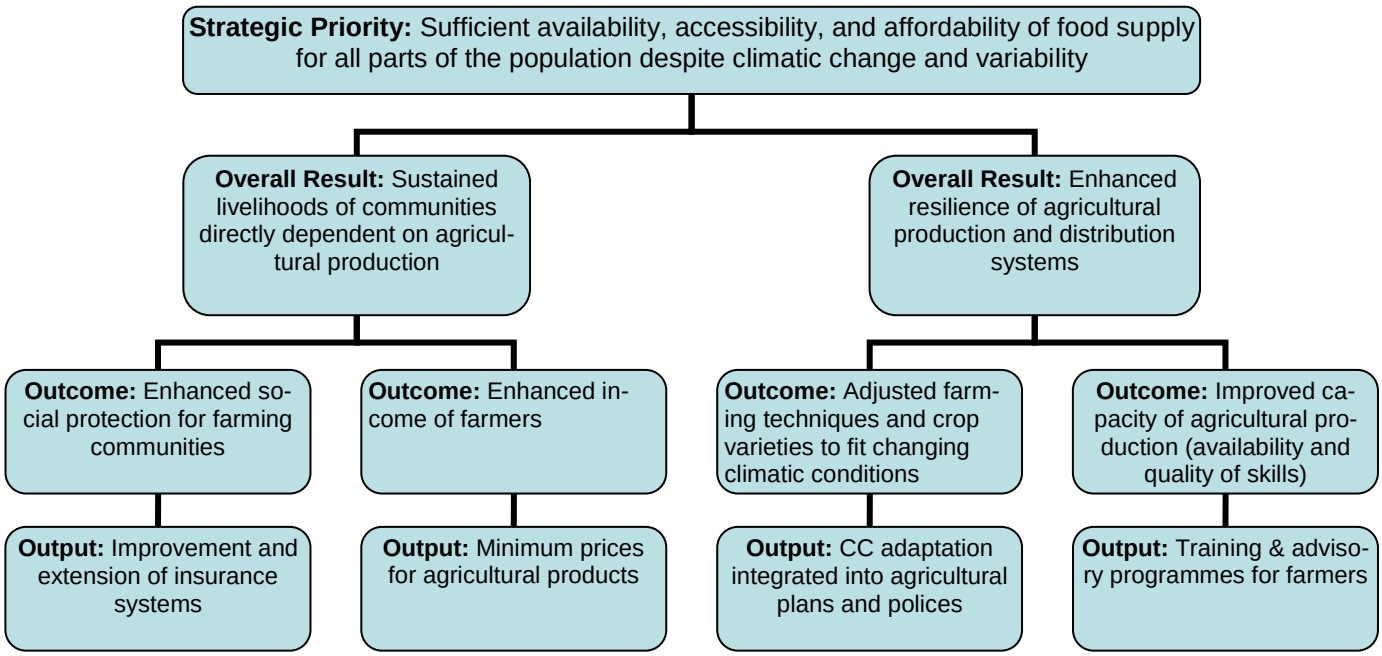
Precipitation

- Reduction in precipitation during the peak summer month (up to 25% fewer rainfall)
- More autumn and late winter precipitation in mountains to fall as rain rather than snow.
- Some climate models predict an overall reduction in precipitation for the lower lying areas of Khoresia (about 15% less rainfall)

Planning Framework: The Government has approved the Climate Change Adaptation Plan for Action in Khoresia (CCAPAK). Based on detailed vulnerability assessments, the CCAPAK identifies six strategic priorities for adaptation. A results chain including outcomes and outputs has been elaborated for each of them as shown in Figure 4 for the example of food security.

Institutional set-up: Khoresia has established a National Climate Change Policy Board (NCCPB) under the President's Office which has the mandate to develop and implement climate change policies in coordination with all relevant sector ministries. The M&E Expert Group works under the NCCPB.

Figure 4: Excerpt from CCAPAK Results Chain for Food Security



Session 4: Define indicators

Context

The governments of Zanadu and Khoresia want to ensure that their adaption measures are implemented in a way that their intended results will be achieved and that overall their societies become more climate resilient. Development of appropriate indicators will be an important part of the methodological framework.

Instructions for case work

- You continue to be a member of the advisory group on M&E (Zanadu) resp. the M&E Expert Group (Khoresia) supporting the governments in developing the M&E systems.
- You have already identified in Session 3 that both climate change impact and responses will be important focus areas of the future M&E system in Zanadu and Khoresia.
- You are asked to further specify the M&E focus areas by **defining first examples of indicators** in **Matrix 3a** (Zanadu) or **Matrix 3b** (Khoresia). For Khoresia this will be restricted in this exercise to the example of the strategic priority of **food security**. In Zanadu you will focus on the priority area **agricultural production.**
- The climate change impacts and adaptation measures in **Matrix 3a** and **Matrix 3b** are extracted from the more comprehensive description in the following exhibits:
    - **Exhibit 2a:** Zanadu: Key features for the Priority Area ‘agricultural production’
    - **Exhibit 2b:** Khoresia: Key features for the Strategic Priority ‘food security’

-

Zanadu	
Climate Change impacts	**Suggestions for indicators**
Maize and wheat yields decreased due to temperature rise	
Rice production threatened by higher temperature and water scarcity	
Crop water requirement increases due to temperature rise	
Adaptation Responses	**Suggestions for indicators**
Apply climate proofing to upcoming National Water Policy	
Introduce better water management techniques (irrigation)	
Agricultural extension services integrate adaptation measures	

Matrix 3a: Formulation of draft indicators for Zanadu

Khoresia	
Climate Change impacts	**Suggestions for indicators**
Yields impacted by invasion of pests	
Changed run-off due to changes in snowmelt affecting irrigation	
Increased scarcity of agricultural land due to aridity and erosion	
Adaptation Responses	**Suggestions for indicators**
Conduct trainings to raise awareness and assist farmers in optimising their farming techniques	
Promote drought resistant crops / crop varieties	
Introduce sustainable pest management	

Matrix 3b: Formulation of draft indicators for Khoresia

Exhibit 2a: Zanadu: Key features for the Priority Area 'agricultural production'

One of the most vulnerable sectors in Zanadu is 'agricultural production'. This priority area is very important to the development of the country since more than half of the population directly depend on agricultural production for their livelihoods.

The following climate related developments might **endanger agricultural production**:

- Change in precipitation patterns and distribution: Higher intensity rainfall events with longer periods between events.
- Maize and wheat yields decrease due to temperature rise of 1-2°C.
- Rice production threatened by higher temperatures during flowering and by water scarcity during summer month.
- Crop water requirements increase by 3-5% by 2030 especially due to increasing share of plantation crops.

The Government of Zanadu aims to implement the following **measures**:

Policy:

- Climate proof upcoming National Water policy
- Strengthening of alternative sectors (e.g. high tech and tourism)

Technical support:

- Better water management techniques (both traditional and innovative)
- Diversification of crops

Capacity building:

- Agricultural extension services integrate adaptation measures

Research and development:

- Applied research on diversification to additional crops and crop varieties

Exhibit 2b: Khoresia: Key features for the Strategic Priority 'food security'

Khoresia's CCAPAK includes the following **overall goal** in respect to the Strategic Priority 'food security':

- Sufficient availability, accessibility, and affordability of food supply despite climatic change and variability.

This goal is of particular relevance since more than half of the population of Khoresia directly depend on the agricultural sector for their livelihoods.

The following climate related developments might **endanger food security**:

- Increasing aridity of agricultural land due to a larger number of hot days. Erosion caused by deforestation also contributes to this development.
- Maize and wheat yields negatively affected by temperature rise.
- Changed run-off from snow melt.
- Agricultural yields impacted by invasion of pests whose eggs no longer get killed in winter due to fewer days with temperatures below 0°C [32°F]

The Government of Khoresia envisages the following **projects and measures** to support the achievement of the food security goal:

- Trainings to help farmers optimise their farming techniques in light of changing climatic conditions.
- Introduction of alternative fuel sources for cooking to reduce deforestation (a main cause of erosion)
- Promotion of drought resistant crops.
- Improved design of irrigation schemes where sustainable water supply is under threat.
- Increased pest management programmes.

Session 5: Indicator quality check

Context

In Session 4, draft indicators for monitoring climate change impacts and the implementation of adaptation measures in Zanadu and Khoresia were developed. In the meanwhile, the M&E system development for Khoresia has progressed and resulted in a first list of indicators as shown in **Matrix 4** (based on the results chain shown in Figure 4, page 26).

Instructions for case work

- As member of the M&E Expert Group (Khoresia) you are requested to reflect these new indicator proposals which are presented in **Matrix 4.**
- As the member of the advisory group on M&E (Zanadu) you are requested to reflect on the indicator proposals which you developed in Session 4 (use **Matrix 5**).
- You are invited to **check the quality of the respective indicators against the SMART criteria** (see Box 2)
- Please indicate in the third column where and in how far you see needs for improvement.
- Try to develop better indicators in the fourth column if necessary.

Box 2: Criteria for the selection of good indicators

Criteria for the selection of good indicators

⇒ **S** Specific: the indicator is valid and describes the underlying issue.

⇒ **M** Measurable, practicability: rely on sound data obtained through reproducible methods independent from the individual collectors of the information.

⇒ **A** Attainable: the target value and milestones of an indicator should be realistic.

⇒ **R** Relevant: address an important issue for the users and related to the objective of M&E.

⇒ **T** Time-bound: related to time and milestones so that progress can be shown during the course of implementation

Matrix 4: Draft indicators for the CCAPAK priority area 'Food Security' in Khoresia

(Based on the results chain shown in Figure 4)

Element of results chain	Proposed indicator	In line with SMART criteria? If not: why?	Suggestion for new or adjusted indicator
Overall Result 1: Sustained livelihoods of communities directly dependent on agricultural production			
Outcome 1.1 Enhanced social protection for farming communities	Amount of insurance paid to farmers as compensation for losses incurred due to climate impacts		
Activity 1.1.1 Improvement and extension of insurance systems	Number of insured people		
Outcome 1.2 Enhanced income of farmers	Overall income of farmers		
Activity 1.2.1 Introduce minimum prices for agricultural products	Minimum price established for each agricultural product.		
Overall Result 2: Enhanced resilience of agricultural production and distribution systems			
Outcome 2.1 Adjusted farming techniques and crop varieties to fit changing climatic conditions	Farmers use crops (seeds) that can cope with expected climatic changes		
Activity 2.1.1 CC adaptation integrated into agricultural plans and polices	No of plans and policies with integrated climate change aspects		
Outcome 2.2 Improved capacity of agricultural production (availability and quality of skills, management and technology)	Frequency of demand for extension service advice		
Activity 2.2.1 Training and advisory programmes for farmers	No. of people who participated in CC training programmes		

Matrix 5: Draft indicators for the priority area 'agricultural production' in Zanadu

Enter the indicators you formulated in session 4 (**Matrix 3a**) into the second column.

Element	Proposed indicators from session 4	In line with SMART criteria? If not: why?	Suggestion for new or adjusted indicator
Climate change impacts			
Maize and wheat yields decreased due to temperature rise			
Rice production threatened by higher temperature and water scarcity			
Crop water requirement increases due to temperature rise			
Adaptation responses			
Apply climate proofing to upcoming National Water Policy			
Introduce better water management techniques (irrigation)			
Agricultural extension services integrate adaptation measures			

Session 6: Use of existing M&E systems

Context

The M&E expert group in Khoresia decided to make as much as possible use of existing M&E systems in order to minimize the need for resources by the future M&E system. Therefore, the M&E expert group prepared an inventory of existing monitoring and data systems to get a more precise picture. The condensed monitoring inventory is documented in **Exhibit 3**.

Instructions for case work

- In this exercise, all groups are working on the case of Khoresia.
- You are invited to explore the Monitoring Inventory and identify how far you can make use of the data already being measured.
- In case you identify potentials to modify existing monitoring systems to better address the purpose of what you want to measure (e.g. in respect to frequency or geographical resolution), indicate suggested changes in the last column.

Use

- Matrix 6 for this task.

Monitoring or data system	How far is the system potentially usable/ relevant for adaptation? Is it mainly relevant for CC impact or adaptation response monitoring?	What could be improved to make existing monitoring systems better usable/more relevant for the monitoring of CCAPAK goals?

Matrix 6: Analysis of the inventory of monitoring systems

Exhibit 3: Inventory of existing monitoring or data systems in Khoresia

Collected data	Frequency of measurement	Geographical resolution	Responsible institution
Key meteorological data (daily mean temperature and precipitation, air pressure)	• Daily	• Nationwide (mean values) • State wide (mean values) • For each of the 10 meteorological stations of Khoresia	Meteorological Office of Khoresia
Storm event (number of events)	• Yearly	• Nation wide	Meteorological Office of Khoresia
Ground water level	• One per year	• Appr. 30 control points per State	National Hydrometeorological Service (Hydromet)
Water flow in rivers	• Twice per year	• 1 – 2 gauge stations for each larger river	National Hydrometeorological Service (Hydromet)
Number of flood events	• Yearly	• State wide	National Hydrometeorological Service (Hydromet)
• Yield (tons) for each crop • Income of farmers (KHOR $) per crop	• Yearly	• Mean values for each agricultural region	Regional Agricultural Chambers
Fees collected from farmers for consumption of irrigation water	• Yearly	• Mean values for each agricultural region	Regional Agricultural Chambers
Amount reimbursed to farmers under disaster compensation insurance	• Yearly	• Mean values for each agricultural region	Regional Agricultural Chambers

Session 7: Real case reflection

Context

During the previous exercises, you mainly focused on the fictitious cases of Zanadu and Khoresia. In this session, you will explore how challenges and approaches analysed in previous exercises are dealt with in practice. The rationale is to learn from real adaptation M&E systems and their development process at national and subnational level.

Setting

There are different options how the real case reflection can be conducted.

A number of relevant examples can be chosen by participants and/or the trainers, be presented to the group and analysed and discussed in small groups. Specifically for this purpose, GIZ has compiled an **overview of national-level adaptation M&E systems** in the form of factsheets and method briefs which are available on AdaptationCommunity.net ➜ Knowledge ➜ Monitoring and Evaluation, for example the study "Monitoring and Evaluating Adaptation at Aggregated Levels: A Comparative Analysis of Ten Systems". As of November 2013, these include descriptions of the adaptation M&E systems from the following countries: **France, Germany, Kenya, Morocco, Nepal, Norway, the Philippines and the United Kingdom.** In addition, the adaptation indicator systems of the *Pilot Programme for Climate Resilience (PPCR)* and of the *Mekong River Commission* are described.

Additional material may be provided by the trainers or by trainees. If participants of the training represent different countries and/or are familiar with specific national adaptation M&E systems, they could present these approaches to the group.

To analyse the national cases, participants can refer to an **M&E analysis template** which was developed for the GIZ M&E pilot workshop in Mexico. The template has three focal areas:

1. National context with regard to adaptation in general and starting point for M&E
2. The development process of a national adaptation M&E system
3. Design and operationalisation

For each of these focal areas a number of questions guide the trainees through the process of analysing and comparing different M&E systems. The M&E analysis template can be downloaded at ➜ Knowledge ➜ Monitoring and Evaluation (or contact Timo.Leiter@giz.de).

Overall, session 7: *Real case reflection* can be tailored to the specific purpose and target audience of the training course and your trainers will explain you the format they intent to use. Further suggestions are provided in the trainer's handbook.

Session 8: The way forward (roadmap development)

Context

The practical implementation of developing an M&E system at (sub)national level will be confronted with various obstacles. In distinction to the previous exercises, you are not a member of the M&E expert group in the fictitious countries Zanadu or Khoresia anymore. Instead, you are invited to reflect the **actual situation in your work context**.

Instructions for case work

- Please reflect what you consider necessary to successfully launch an M&E system development process taking into consideration existing conditions you are confronted with in your work context.
  If you come from different countries/regions with differing conditions or different sectors, you might indicate in **Matrix 7**, which statement is relevant for which country or background.
- You may use **Matrix 7** for elaborating a roadmap responding to various steps for developing an M&E system.

Matrix 7: Road map for your work context

Steps / potential challenges	Possible approaches for enhancing capacities and conditions for development of an adaptation M&E system
Engage all agencies and offices relevant for adaptation M&E, explain the need for it, ensure a high-level mandate to operate	
Define the objective of M&E; identify links to existing strategies and M&E systems	
Ensure necessary expertise and financing for the M&E system development (and its future implementation) is available	
Get access to necessary data, work towards smooth cooperation among involved actors	
Find a balance between reducing complexity and generating useful M&E information, keeping in mind the objective and the often limited capacities of the institutions involved	
Ensure that crucial results of the adaptation M&E system are reflected upon and inform policy making / implementation of adaptation	
Other important issues	

Module 6b: M&E for adaptation projects and programmes

6	M&E Introduction
6a	M&E for adaptation at (sub)national level
6b	**M&E for adaptation projects and programmes**

Learning objective for the Module:

The implementation of selected adaptation measures requires planning and monitoring. Monitoring and evaluation can contribute to effective management, learning and accountability. You learn how to plan adaptation measures and develop results-based monitoring systems.

Session 9: Planning the implementation of adaptation measures

Context

The development process of the Federal Republic of Zanadu is steered by the **National Development Plan (NDP) 2012-2022** (see page 13). The Government of Zanadu has decided to take climate change considerations into account in the implementation of the plan. The National Planning Commission has established a **climate change advisory** group to support this process.

The advisory group has compiled a list of expected climatic changes and possible impacts (see pages 14 and 15). The Ministry of Agriculture (MoA) wants to implement a pilot project to test the implementation of a good practice adaptation measure that helps to address the NDP goal “Increase and diversify agricultural production and rural incomes”. Based on advice from the climate change advisory group the MoA has selected the adaptation measure **drip irrigation technology** to be piloted on cotton farms in the West State of Zanadu.

Instructions for case work

- **Exhibit 4** describes the drip irrigation technology, its advantages and disadvantages.
- **Exhibit 5** provides details about the drip irrigation pilot application.
- **Matrix 8** states guiding questions for the development of an implementation plan.

Your task

- Your team has been tasked by the MoA and the government of the West State to outline a plan for implementing the pilot measure of drip irrigation

- Based on the information in **Exhibit 4 and Exhibit 5**, use **Matrix 8** to develop an implementation plan.

Exhibit 4: Drip irrigation technology

Drip irrigation is an irrigation technique by which water is directly delivered to the water absorbing parts of the plant either onto the soil surface or directly onto the root zone, through a network of pipes, tubing, and emitters (see Figures 5 and 6). Drip irrigation is adopted particularly in areas of water scarcity and especially for crops such as cotton or maize.

Advantages of drip irrigation

- Maximises water application efficiency
- Minimises soil erosion and weed growth
- Enables use of recycled water
- Requires lower pressures compared to other irrigation methods, which reduces energy demand and costs

Disadvantages of drip irrigation

- Expenses: initial cost of materials and installation
- Time for maintenance (e.g. emitters may clog and no longer release water)
- If the water used for irrigation has a high salinity, salts may build up in the root zone due to limited leaching

Figure 5: An emitter slowly releases water drops close to a plant's soil surface. [7]

Figure 6: A tube of a drip irrigation system delivers water to each plant.[8]

[7] Photo source: http://driptips.toro.com/wp-content/uploads/2012/03/drip-irrigation-emitter1.jpg
[8] Photo source: http://www.kovamred.ro/en/irigatii_picurare/

Exhibit 5: Details of the drip irrigation pilot application

MoA has selected the adaptation measure **drip irrigation technology** to be piloted on cotton farms in the West State of Zanadu. The Department of Agriculture of the West State (DA-WS) has been tasked with overseeing the project. DA-WS intends to pilot the technology on 10 medium sized cotton farms outside the city of Lapa (see map on p.11). Most of the farms in this area currently use irrigation sprinklers which need high water pressures and relatively large amounts of water per hectare farmland.

DA-WS has not yet started identifying possible participating farms but it has decided that participation of the privately owned farms should be voluntarily and the owners should be committed to supporting the pilot for its entire duration. Thus, the farm operators need to be convinced of the benefit from the pilot application for their ongoing business.

First time installation at the farms would cost an upfront amount of about 10,000 Zanadu dollars each, which most farms would struggle to pay in a lump sum. However, drip irrigation is expected to reduce the annual operating costs for energy and water. In addition, some of the current irrigation equipment used at cotton farms in the West State is rather old and would need to be replaced in the medium term. DA-WS has secured a limited budget from the MoA to implement the pilot application and assist the farms in acquiring the new technology.

If the pilot application is successful, DA-WS will consider a scale-up of the technology to ease the conflict between water demand for agriculture and the rising demand in urban areas.

Matrix 8: Implementation plan for the pilot measure drip irrigation technology

The implementation plan should address the following questions**:**

Adaptation context

- Which climate change impacts does the pilot measure address?
- How could it help to reduce the vulnerability of the West State to climate change?

Aim

- What does DA-WS intend to find out through the pilot application? Formulate an objective for the pilot application.

Planning

- What activities need to be done to implement the pilot application? Consider the following:
  - Current situation: farms not identified, farm owners possibly unaware of new technology, upfront investment required etc.
  - Who needs to be involved in these activities?
  - How could participation in the pilot be incentivized?
- Estimate how much time it may take to engage and select farms, install the technology and train employees.
- Estimate how long it takes to assess the effects of the new technology.

Monitoring and evaluation

- How could success of the pilot be assessed? What information would be needed?
- How could monitoring at the farm level take place? Which metrics could be useful?

Session 10: Development of a results chain

Context

Based on the initial planning of the pilot application the MoA and the Department of Agriculture of the West State (DA-WS) have agreed on three components of the pilot project for drip irrigation in the West State. The Climate Change Advisory Group has been tasked with defining outcomes and outputs for each component.

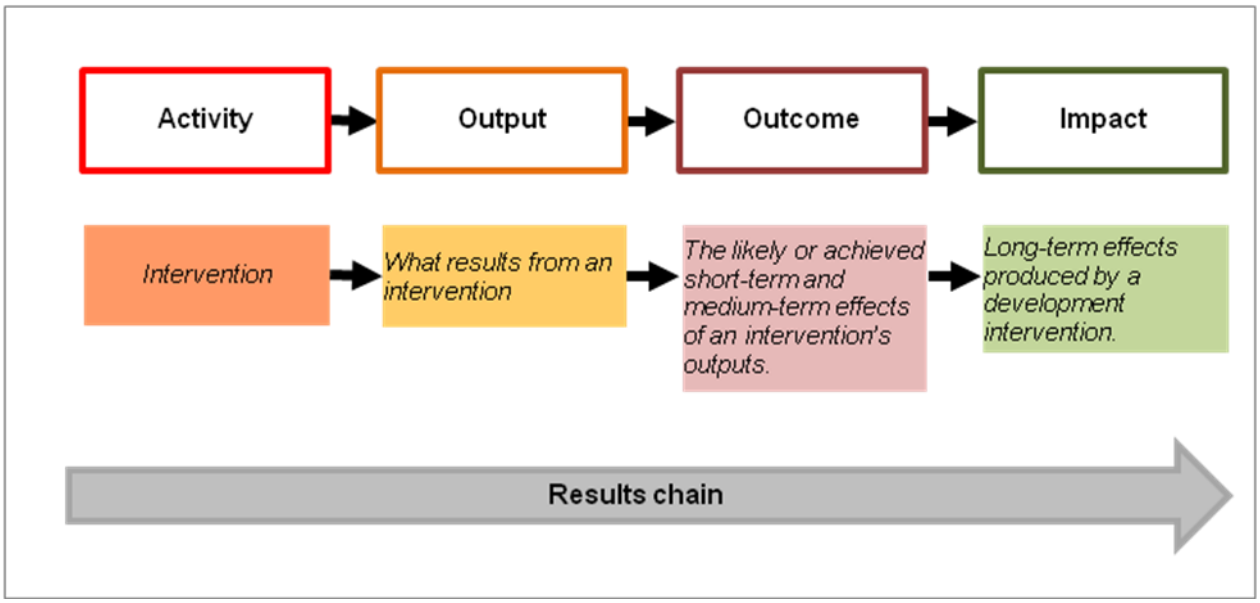
Instructions for case work

- Figure 7 illustrates the concept of **results chains**. Results chains describe a logical sequence from inputs (money, time, knowledge) invested in activities to achieve first outputs which short term or medium term effects (outcomes) that contribute to long term effects (impacts). Results chains involve **assumptions** of how each category leads to the next, i.e. under what circumstances a certain output leads to the associated outcome. [9]
- Matrix 9 shows the three pilot components and the columns for expected outcomes and outputs. This refers to step 3 of the five-step approach (compare Exhibit 6 on page 46).

Your task

- Transfer the **objective** of the pilot project which you defined in session 9 into the second row of Matrix 9. Revise it if necessary.
- As member of the climate change advisory group you are requested formulate **one outcome and two outputs for each component** using Matrix 9. An example is given in the first row.
- In the fourth column, articulate what **assumptions / hypothesis** are made about how each output leads to the associated outcome.

Figure 7: Results chain



[9] For more information see OECD (DAC) 2002; "Glossary of Key Terms in Evaluation and Results Based Management"; Evaluation and Aid Effectiveness, No 6 http://www.oecd.org/dataoecd/29/21/2754804.pdf

Matrix 9: Develop a results chain

Pilot application: drip irrigation technology			
Objective of the pilot:			
Component	**Expected outcome**	**Expected outputs**	**Assumptions** under which outputs lead to outcomes
1: Awareness raising for the benefits of drip irrigation	*Farm operators in the target area are aware of the benefits of drip irrigation*	*1a) Information material has been produced and distributed* *1b) Extension services are provided to promote drip irrigation*	*Farm operators in the target area receive and understand the information provided*
2: Assistance for farms to participate in the pilot including economic incentives		2a) 2b)	
3: Use of drip irrigation in 10 pilot farms and ongoing assessment of its benefits		3a) 3b)	

Session 11: Development of indicators

Context

The expected outputs and outcomes of the components defined in Session 10 form the basis for the development of indicators within a results-based M&E System. This refers to step 4 in the 5-step approach as explained in the introductory presentation (compare **Exhibit 6**).

Instructions for case work

- **Box 3** outlines steps towards indicator formulation and Box 4 describes quality criteria for good indicators
- **Exhibit 6** describes the Five-step process towards planning adaptation measures and results-based monitoring systems which was presented during the introduction
- **Matrix 10** assists you in elaborating the indicators.

Your task

- Please transfer outputs and outcomes as defined in Session 10 into the columns of **Matrix 10** and develop for each of them an adequate output and outcome indicator.
- Additionally, please check whether your suggested indicators comply with the SMART rule described in Box 4.
- Also consider what data is needed to measure the indicators and how the data could be collected.

Steps towards indicator formulation

1. Define its subject, *e.g. qualification of water management staff*
2. Specify quantity of change, *e.g. 50% of all water managers trained*
3. Specify quality of change, *e.g. trained in up-to-date water management techniques*
4. Define time horizon, *e.g. within the next two years*
5. If applicable: specify regional aspect, *e.g. water management staff within South State*

Box 3: Steps towards indicator formulation

Criteria for the selection of good indicators

⇒ **S** Specific: the indicator is valid and describes the underlying issue.
⇒ **M** Measurable, practicability, rely on sound data obtained through reproducible methods independent from the individual collectors of the information.
⇒ **A** Achievable (only applicable to targets).
⇒ **R** Relevant: address an important issue for the users and related to the objective of M&E.
⇒ **T** Time-bound: related to time and milestones so that progress can be shown during the course of implementation

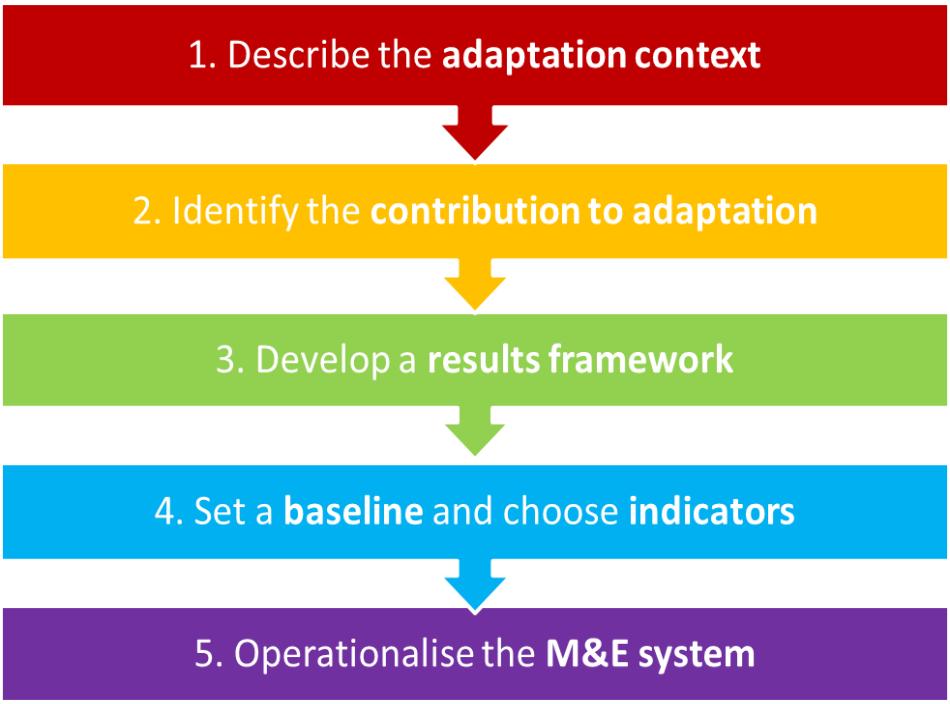
Box 4: Criteria for the selection of good indicators

Matrix 10: Develop indicators as part of a results chain

Pilot application: drip irrigation technology				
Objective of the pilot:				
Component	**Expected outcome**	**Suggested outcome indicator**	**Expected outputs**	**Suggested output indicators**
1: Awareness raising for the benefits of drip irrigation	Farm operators in the target area are aware of the benefits of drip irrigation	*At least 50% of the farm operators in the target area have learned about the benefits of drip irrigation in the first 6 month of the project*	a) Information material has been produced and distributed b) Extension services are provided to promote drip irrigation	*a) Information material on the benefits of drip irrigation that is well understood by the target audience has been developed and received by at least 50% of the farms I the target area* *b) Existing extension services staff have been trained on the application of drip irrigation and have the resources to provide this knowledge to at least 25% of the farms on the targeted area through field visits*
2: Assistance for farms to participate including economic incentives			a) b)	
3: Use of drip irrigation in 10 pilot farms and ongoing assessment of its benefits			a) b)	

Exhibit 6: Five step approach to adaptation planning and development of an M&E system

Based on an analysis of the adaptation context (i.e. the local vulnerabilities, expected climate change impacts, political, social and economic conditions), adaptation projects and programmes need to specify how they will contribute to reducing vulnerability or increasing adaptive capacity. Being able to demonstrate adaptation results is important to justify resources spent. Results-based monitoring can also support project steering. For this purpose, GIZ (2013) has developed a five-step approach to designing adaptation projects and their results-based monitoring systems as shown in the figure below.



The approach is described in detail in the GIZ guidebook ***Adaptation made to measure*** (second edition as of November 2013 available in English, French and Spanish on AdaptationCommunity.net under Monitoring & Evaluation and Further Reading.

Session 12: Real case reflection

Context

During the previous exercises, you mainly focused on the fictitious country of Zanadu. In this session, you will explore how challenges and approaches analysed in previous exercises are dealt with in practice. The rationale is to learn from real adaptation M&E systems and their development process at project and programme level.

Setting

There are different options how the real case reflection can be conducted. A number of relevant examples can be chosen by participants and/or the trainers, be presented to the group and analysed and discussed in small groups. GIZ's guidebook *Adaptation made to measure* includes an example results framework from an adaptation project in India. The accompanying repository of adaptation indicators can be used to illustrate possible adaptation indictors for a variety of sectors. Other project examples can be found for instance

- in the project proposals to the **Adaptation Fund** each of which includes a detailed results framework (https://www.adaptation-fund.org/funded_projects)
- in the project descriptions of the **Strategic Climate Change Fund** of the Global Environment Facility: http://www.thegef.org/gef/sccffsp

Additional material may be provided by the trainers or by trainees. If participants are familiar with a results framework of an adaptation project, they could present it to the group.

The **five-step approach** described in detail in GIZ's guidebook ***Adaptation made to measure*** can be used to assist in analysing the chosen cases. The second edition of the guidebook from November 2013 is available at AdaptationCommunity.net ➜ Knowledge ➜ Monitoring and Evaluation ➜ Further reading. It is also available in Spanish and French. For questions about the guidebook please contact Timo.Leiter@giz.de or Julia.Olivier@giz.de.

Overall, session 12: *Real case reflection* can be tailored to the specific purpose and target audience of the training course and your trainers will explain you the format they intent to use. Further suggestions are provided in the trainer's handbook.

Session 13: The way forward (roadmap development)

Context

The planning of adaptation-related projects or programmes and the development of a results-based monitoring system in practice will be confronted with various obstacles and challenges. In distinction to the previous exercises, you are not an M&E advisor in the fictitious country Zanadu anymore, but you are invited to reflect the **actual situation in your home country**.

Instructions for case work

- Please think about what you consider necessary to get systematically developed results chains and indicators as part of a result-oriented adaptation M&E system. Take into consideration existing conditions you are confronted with in your daily work.
  If you come from different countries / regions with differing conditions, you might indicate in the Matrix which statement is relevant for which country.
- You may use
- **Matrix** 11 for developing a roadmap responding to various strategy dimensions for developing an M&E system.

Matrix 11: Road map for your real working background

Strategy dimension / potential challenges	Possible approaches for enhancing capacities and conditions for development of the adaptation M&E system
Acquire the necessary expertise for developing an adaptation M&E system	
Focus the results chain on key aspects in light of many potential things to monitor and complex interrelationships	
Get access to all necessary data	
Get sufficient information on projected CC impacts (especially if no Vulnerability Assessment is available)	
Institutional capacities to handle and effectively use results chains	
Political acceptance / appreciation / support	
Others	

Annex

Climate change information sources

This section contains selected information on climate change tools, data, platforms and guides.

Tools

- **CRiSTAL** (Community-based Risk Screening Tool – Adaptation and Livelihoods) by IISD. Tool for community scale vulnerability assessment and adaptation planning. Specifically to (a) Understand the links between livelihoods and climate in their project areas; (b) Assess a project's impact on community-level adaptive capacity; and (c) Make project adjustments to improve its impact on adaptive capacity and reduce the vulnerability of communities to climate change. Users can follow this process through a Microsoft Excel interface or by reading the accompanying document (User's manual). http://www.cristaltool.org/content/download.aspx
- **Climate Assessment by GIZ**: A tool to assess whether project goals are threatened by climate change and identify adaptation measures within the scope of the project; and identify climate-friendly way of achieving the project goal. Thus, GIZ's climate assessment refers to (a) Climate Proofing = systematic climate risk reduction & increase of adaptive capacity; (b) Emission Saving = systematic maximisation of contributions to GHG reductions. The tool is mandatory to all GIZ projects. See also a factsheet available on the GIZ website: http://star-www.giz.de/fetch/4Q0ox4X0001G0gE9d1/giz2013-0546en-environmental-climate-assessment.pdf
- **Global Adaptation Atlas** by Resources for the Future, a dynamic climate change impact mapping tool. The Atlas brings together diverse sets of data on the human impacts of climate change and adaptation activities across the themes of food, water, land, health and livelihood to help researchers, policymakers, planners and citizens to establish priorities for action on adaptation. http://www.adaptationatlas.org/index.cfm
- **CEDRA** (Climate change and Environmental Degradation Risk and Adaptation Assessment) by Tearfund. A field tool which helps agencies working in developing countries to access and understand the science of climate change and environmental degradation and compare this with local community experience of environmental change. Adaptation options are discussed and decision-making tools are provided to help with planning responses to the hazards identified. CEDRA includes integrating Disaster Risk Reduction responses as relevant existing forms of adaptation. http://tilz.tearfund.org/en/themes/environment_and_climate/cedra/

Climate Data

- **World Bank climate change data portal**: Provides an entry point for access to climate related data and tools. The Portal provides access to comprehensive global and country data information related to climate change and development and intends to serve as a common platform to collect, integrate and display climate change relevant information at the global scale. http://sdwebx.worldbank.org/climateportal/home.cfm?page=globlemap
- The **OECD Climate Change eXplorer tool** presents climate-related data sets for over 100 developed and developing countries, using animated plots for the period 1960-2011. It covers emission data for different greenhouse gases and a selection of socio-economic indicators, and enables all sorts of analyses and comparisons. http://oe.cd/ccexplorer
- **The Nature Conservancy Climate Wizard** allows users to map historic climate data as well as downscaled projections for the globe (switch to global). http://www.climatewizard.org/
- **Climate Impacts: Global and Regional Adaptation Support Platform (CI:grasp)** is a layered platform providing knowledge about regional climate forcings, its related impacts and systematic regional vulnerability assessments. An interactive climate diagram generator allows a comparison of temperature and rainfall projects for different time scales and climate models for any global grid cell (excluding oceans). As sound information basis for decision-makers and development experts it also provides a database of adaptation projects across the globe. http://cigrasp.org/
- **IPCC Data Visualization**: Part of the Data Distribution Centre (DDC) of the Intergovernmental Panel on Climate Change (IPCC). The DDC provides climate, socio-economic and environmental data, both from the past and also in scenarios projected into the future. Technical guidelines on the selection and use of different types of data and scenarios in research and assessment are also provided. The DDC is designed primarily for climate change researchers, but materials contained on the site may also be of interest to educators, governmental and non-governmental organisations and the general public. http://www.ipcc-data.org/maps/

Learning Platforms

- **AdaptationCommunity.net** is an online exchange platform for adaptation practitioners focusing particularly on four topics: climate information and services, vulnerability assessment, monitoring and evaluation and mainstreaming of adaptation. The platform provides a detailed resource database, webinar recordings and space for virtual exchange: http://www.adaptationcommunity.net
- **Adaptation Learning Mechanism** (ALM) with case studies, publications, country profiles, open to user submissions: http://www.adaptationlearning.net
- **weAdapt** is an online open space on climate adaptation issues for sharing experience and offers adaptation case studies: www.weadapt.org
- **Climate 1-Stop** provides a single location to access climate change tools, resources and information. Users can upload and share materials: http://arcserver4.iagt.org/climate1stop/
- **Community Based Adaptation Exchange**, a platform for exchanging news, events, case studies, tools, policy resources and videos: http://community.eldis.org/.59b70e3d/

Glossary

Adaptation

IPCC (2001) defines adaptation as adjustments in human and natural systems in response to actual or expected climate signals or their impacts, that moderate harm or exploit beneficial opportunities.

This consists of a variety of behavioural, structural and technological adjustments. Activities vary

- in their timing (ex-ante vs. ex-post)
- in their scope (short-term vs. long-term; localised vs. region-wide)
- in their strategy (autonomous vs. planned; passive vs. active)
- in their agents (private vs. public; societies vs. natural systems)

In order to distinguish 'adaptation' from to 'regular development activities', the Guidance describes a continuum of four different levels of activities from development to climate change adaptation (reference to WRI 2007):

- Activities that increase human development and address drivers of vulnerability, e.g. gender initiatives, livelihood enhancement efforts.
- Activities that build response capacity, often in directly affected sectors, e.g. natural resource management, weather monitoring.
- Activities that aim at managing climate risks, mostly through strategic use of climate information, e.g. disaster response planning, drought resistant crops.
- Activities that confront climate change by addressing concrete impacts, e.g. relocation of communities in response to sea-level rise.

Adaptive capacity

Adaptive capacity is a system's ability to adjust to climate change and variability, to moderate potential damage, to take advantage of opportunities or to cope with consequences.
Adaptive capacity is a function of the relative level of a society's economic resources, access to technology, access to climate information, skills to make use of the information, institutions and equitable distribution of resources. Adaptive capacity tends to be correlated with the level of development: more developed countries and communities tend to have more adaptive capacity. (OECD based on IPCC)

In ecosystems, adaptive capacity is influenced by biodiversity (genetic, species, etc.). In social systems adaptive capacity is determined by the individual and/or common ability to cope with change (the ability to learn, manage risks and impacts, develop new knowledge, and devise effective approaches) and the institutional setting (IUCN).

(-> see Figure 3: Focus areas of M&E including components of vulnerability)

Adaptive management	Adaptive management is a structured, interactive process of decision-making in the face of uncertainty, with an aim to reducing uncertainty and improving performance over time: system monitoring, evaluating results and adjusting actions on the basis of what has been learned.
Climate change	Climate change refers to any change in climate over time, whether due to natural variability or as a result of human activity. (IPCC 2001) This usage differs from that in the United Nations Framework Convention on Climate Change (UNFCCC), which defines 'climate change' as: 'a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods'.
Climate (change) scenario	A plausible and often simplified representation of the future *climate*, based on an internally consistent set of climatological relationships and assumptions of *radiative forcing*, typically constructed for explicit use as input to climate change impact models. A 'climate change scenario' is the difference between a climate *scenario* and the current climate.
Climate stresses	Climate stresses are climate extremes to which the system and its components are exposed, e.g. variable temperature and rainfall, cyclical flood, drought, storms, etc.
Coping capacity	Coping capacity is the ability of a system to withstand climate stresses. It does not imply adjustment and change as with adaptive capacity, but rather the ability to endure the impacts.
Ecosystem-based approaches	Ecosystem-based approaches to adaptation use biodiversity and ecosystem services as part of an overall adaptation strategy to help people adapt to the adverse effects of climate change. Ecosystem-based approaches to adaptation use the range of opportunities for the sustainable management, conservation and restoration of ecosystems to provide services that enable people to adapt to the impacts of climate change. (CBD AdHoc Technical Expert Group on Biodiversity and Climate Change)

Emission scenario

A plausible representation of the future development of emissions of substances that are potentially radiatively active (e.g. *greenhouse gases*, *aerosols*) based on a coherent and internally consistent set of assumptions about driving forces (such as demographic and socio-economic development, technological change) and their key relationships (IPCC 2007).

IPCC Special Report on Emissions Scenarios (SRES, 2000) works with different scenarios – to date they were all considered equally sound.[10]

A1 describes a future world of very rapid economic growth, global population that peaks in mid-century and declines thereafter and the rapid introduction of new and more efficient technologies. Major underlying themes are convergence among regions, capacity building and increased cultural and social interactions, with a substantial reduction in regional differences in per capita income. The three A1 groups are distinguished by their technological emphasis: fossil intensive (A1FI), non-fossil energy sources (A1T) or a balance across all sources (A1B).

A2 describes a very heterogeneous world. The underlying theme is self reliance and preservation of local identities and a continuously increasing population. Economic development is primarily regionally oriented and per capita economic growth and technological change more fragmented and slower than other storylines.

B1 describes a convergent world with the same global population that peaks in mid-century and declines thereafter, with rapid change in economic structures toward a service and information economy, with reductions in material intensity and the introduction of clean and resource efficient technologies. The emphasis is on global solutions to economic, social and environmental sustainability.

B2 describes a world in which the emphasis is on local solutions to economic, social and environmental sustainability. It is a world with continuously increasing global population (at a rate lower than A2), intermediate levels of economic development and less rapid and more diverse technological change than in B1 and A1. While the scenario is also oriented towards environmental protection and social equity, it focuses on local and regional levels.

Exposure

Exposure represents the important climate events that affect a system. In practical terms, exposure is the extent to which a region, resource or community experiences changes in climate. It is characterised by the magnitude, frequency, duration and/or spatial extent of a climate event. (IPCC 2007, IUCN 2010). (-> see **Fehler! Verweisquelle konnte nicht gefunden werden.**)

[10] For more information on the different scenarios used by IPCC see http://www.ipcc.ch/publications_and_data/ar4/wg2/en/spmsspm-e.html

Impact (CC)	Impacts are consequences of climate change on natural and human systems. The character and magnitude of an impact is determined by (a) the exposure and (b) the sensitivity of the system. We say *potential* impacts as obviously it is not clear what is going to happen in the future and today's mitigation and adaptation efforts may even prevent their occurrence. *Biophysical impacts* refer to the biophysical parts of a system and often directly result from climate change factors, e.g. damaged infrastructure due to flooding or erosion of shorelines due to storm surge. *Socio-economic impacts* (for the bigger part) follow biophysical impacts and affect socio-economic development, e.g. reduced access to services due to damaged infrastructure or losses in tourism revenues due to shoreline erosion. (-> see **Fehler! Verweisquelle konnte nicht gefunden werden.**)
Impact (M&E)	Positive and negative, primary and secondary long-term effects produced by a development intervention, directly or indirectly, intended or unintended. (OECD 2002)
Indicator	Quantitative or qualitative factor or variable that provides a simple and reliable means to measure achievement, to reflect the changes connected to an intervention, or to help assess the performance of a development actor. (OECD 2002)
Maladaptation	In the OECD policy guidance, Integrating Climate Change Adaptation into Development Co-operation, maladaptation is defined as business-as-usual development, which, by overlooking climate change impacts, inadvertently increases exposure and or vulnerability to CC. Maladaptation could also include adaptation measures which in the end do not lead to reduced but increased vulnerability because of lack of information, wrong assumptions, ill-devised implementation, side effects, etc.

Model

A climate model is a numerical representation of the climate system based on the physical, chemical and biological properties of its components, their interactions and feedback processes and accounting for all or some of its known properties. There are models of varying complexity (i.e., for any one component or combination of components a hierarchy of models can be identified, differing in such aspects as the number of spatial dimensions, the extent to which physical, chemical or biological processes are explicitly represented, or the level at which empirical parameterisations are involved).

General Circulation/Climate Models (GCM) represent the earth's climate (including atmosphere, oceans and land), coupled with atmosphere/ocean/sea-ice General Circulation Models (AOGCMs) provide a comprehensive representation of the climate system. *Regional Climate Models (RCM)* are used to develop smaller scale climate projections. Models are also developed for other systems to project impacts, such as hydrologic models.

Climate models are applied as a research tool to study and simulate the climate, e.g. develop projections of future climate based on greenhouse gas emissions scenarios, but also for operational purposes, including monthly, seasonal, and inter-annual climate predictions. (IPCC 2001)

No regret option

Adaptation actions that benefit development and are justified regardless of climate change.

Observations

Measured, experienced weather conditions, e.g. from a weather station.

Outcome

The likely or achieved short-term and medium-term effects of an intervention's outputs. (OECD 2002)

Output

The products, capital goods and services which result from a development intervention; may also include changes resulting from the intervention which are relevant to the achievement of outcomes. (OECD 2002)

Prediction

A climate prediction or climate forecast is the result of an attempt to produce an estimate of the actual evolution of the climate in the future, e.g., at seasonal, inter-annual or long-term timescales.

Project phase "appraisal"

Project appraisal is the stage when each discrete project proposal selected is formulated and analysed in more detail and when the viability of the project is evaluated against multiple criteria, e.g. economic, environmental, health, safety, certainty of performance, etc. The results inform the decision regarding the specific form under which the project should be pursued. (OECD)

At this point a climate-risk assessment provides the opportunity to reduce the climate change risks facing a project and to take advantage of any opportunities that may arise from climate change. In addition, this is also the stage where an Environmental Impact Assessment is carried out.

Project phase "detailed design"	Detailed design is the stage when the findings of the appraisal stage can be implemented and the bulk of the project parameters is finalised before implementation. (OECD)
Project phase "identification"	This first step in the project cycle comprises the establishment of indicative objectives, general guidelines and principles for the project, according to policies and strategies. The key output of this stage is normally a logical framework that outlines a set of interventions to be implemented within a specific time-frame and within an allocated budget. Project implementation agencies and management rules and procedures are also indicated. (OECD) In order to integrate adaptation, the project can be evaluated at this stage to assess whether it is in principle climate-sensitive or whether it may affect the vulnerability of a human or natural system.
Project phase "M&E"	Monitoring serves to identify successes and problems during project implementation, to enable informed and timely decision making by project managers and to assess the accountability for the resources and results achieved. Evaluation has broader scope, i.e. whether or not the right objectives and strategies were chosen and whether the intended results have been achieved, and if not, why. Evaluation is undertaken periodically usually at completion or ex post. (OECD)
Projection	A climate projection is the calculated response of the climate system to emissions or concentration scenarios of greenhouse gases and aerosols, or radiative forcing scenarios, often based on simulations by climate models. Projections are distinguished from predictions in order to emphasise that projections involve assumptions – concerning, for example, future socio-economic and technological developments, that may or may not be realised – and are therefore subject to substantial *uncertainty*. (IPCC 2007)
Resilience	The ability of a social or ecological system to absorb disturbances while retaining the same basic structure and ways of functioning, the capacity for self-organisation and the capacity to adapt to stress and change. (IPCC 2001) The ability of a social or ecological system to cope and adapt to changes in the environment. In practice building resilience can be considered analogous to decreasing vulnerability. (IUCN 2010)
Results chain	The causal sequence for a development intervention that stipulates the necessary sequence to achieve desired objectives beginning with inputs, moving through activities and outputs, and culminating in outcomes, impacts and feedback. (OECD 2002)

Sensitivity	Sensitivity is the degree to which a system can be affected, negatively or positively, by changes (in climate). Changes may have direct or indirect effects. In ecological systems, sensitivity is described in terms of physiological tolerances to changing conditions. The sensitivity of social systems depends on economic, political, cultural and institutional factors. These factors can confound or ameliorate climate exposure. (IUCN) (-> see Figure 3: Potential focus areas of adaptation M&E)
System of interest	The 'system of interest' is the unit you chose to assess with respect to your question. You may determine your system of interest at different levels, e.g. a single crop system, an ecosystem, a region – depending on the objective of your analysis. (Imagine looking at your house from different angles.) Elsewhere, you may find 'system of interest' called 'exposure unit'.
Trend	Changes in climate that show a similar direction over time. An *observed/historic trend* could be, for example, the later arrival of rainfall over the last five years. *Projected trends* give a possible future direction, e.g. decreasing rainfall in summer, and if combined with a data range (decrease of 10 days of rain or decrease of X amount of rain) can help to devise adaptation measures.
Vulnerability	Vulnerability is the degree to which a system is susceptible to, and unable to cope with, adverse effects of climate change. Vulnerability is a function of exposure to climate stresses, sensitivity and adaptive capacity. Vulnerability increases as the magnitude of climate change (exposure) or sensitivity increases, and decreases as adaptive capacity increases. (-> see Figure 3: Potential focus areas of adaptation M&E)

Abbreviations

CC	Climate change
CCA	Climate change adaptation
CCAPAK	Climate Change Adaptation Plan of Action for Khoresia
DA-WS	Department of Agriculture of the West State
FAO	Food and Agriculture Organization
FDI	Foreign Direct Investment
GHG	Greenhouse gas
GoZ	Government of Zanadu
Hydromet	Zanadu National Hydrometeorological Service
IPCC	Intergovernmental Panel on Climate Change
MoA	Ministry of Agriculture
MoW	Ministry of Water Resources
M&E	Monitoring and Evaluation
NDP	National Development Plan
NPC	National Planning Commission
ODA	Official Development Assistance
PRA	Participatory Rural Appraisal
SWA	State Water Authority
SWP	State Water Programme

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